

PX/QX with Coupler



Installation Manual

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Liberty PX/QX with Coupler Installation Manual

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CHAPTER

1

INTRODUCTION

This Installation Manual details the steps necessary for the proper installation and configuration of the PX/QX with Coupler (PAB/SAB) systems.

In this manual, most illustrations and pictures will show the PX as a place of reference, but it is to be understood that each antenna would be installed in the same manner (unless otherwise noted).

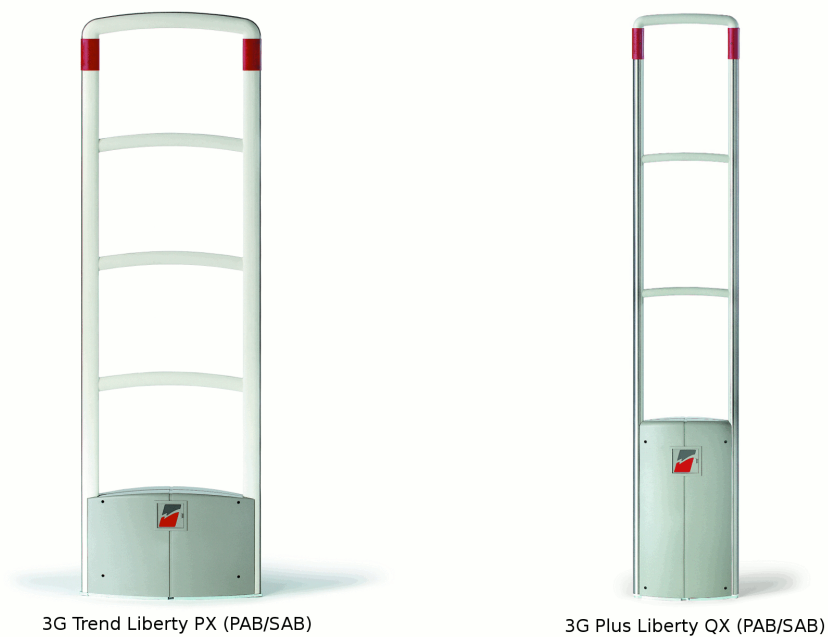


Figure 1 PX and QX with Coupler Antennas

INSTALLATION OVERVIEW

Overview

This chapter is an overview of the installation process:

1. Requirements: Tool and part requirements for a typical installation.
2. Installation Outline: Lists the basic installation steps in sequence.

Requirements

Tools

The following tools are required for Liberty Antenna installations:

- Arrow T-25 Staple Gun
- Diagonal wire cutter
- Hammer drill with 3/16" and 1/2" bits
- Extension cord
- Tape Measure
- Hammer
- Marker, Black Felt
- Ratchet driver with 9/16" socket
- Screwdrivers, mini, regular and #2 Phillips
- Hacksaw
- Utility knife
- Wire Snake
- Wire Strippers
- Wrench, combination end 9/16"
- PX/QX With Coupler Installation Manual (This manual)
- Tuning Procedure, TR4024/26 Checkpoint 7255486
- Checkpoint Systems Field Service Diagnostic Management Software (DMS version 1.5.8 or later version) installed on a laptop with the appropriate cables. DMS is an application

developed to install and configure TR4024/26 boards via serial connections. DMS provides for firmware updates without replacement of microchips.

Parts

Quantity will vary according to site.

- 18 AWG 2-conductor (STP)
- CAT5e cable
- 22 AWG 4-conductor (STP) (5594)
- 1/2" Anchor Bolts
- *DekDuct (wire chase)
- *Wiremold (1500 or 2600 series)
- *Wiremold anchor bolts Note:

*Wire routing methods will vary by installation.

Installation Outline

Follow this sequence to successfully install the components:

1. Determine optimal antenna placement based upon antenna type, tag type, and door opening width. (Refer to the Liberty Product Reference Guide)
2. Determine power supply requirements and the ideal power supply location. (See "Appendix 2 Power Supplies")
3. Physically mount the antennas.
4. Connect the antenna wiring.
5. Install peripherals.
6. Configure the system using DMS.

The information covered in steps 1 and 2 is generally used during the survey and planning stage, but it is important for the installer to keep these specifications in mind to ensure that the systems are installed to specification.

PHYSICAL INSTALLATION

Overview

This chapter covers the physical placement and installation of the Liberty antennas and power supply in the following sections:

1. Placement: How to determine the proper placement of the antennas.
2. Power Supply: Information on typical power supply placement.
3. Wire Routing: Information on typical wire routing methods.
4. Antenna Mounting: Antenna mounting information.

Placement

For the purposes of consistency, the measurements listed and shown in this chapter are baseline measurements, based on the 410 series tag. If an installation must support other tag types, the on-center distance between antennas may deviate from what is shown in this chapter. For detailed information please refer to the Liberty Product Reference Guide•

To meet both CE and FCC requirements, all measurements will be listed in the following format: Metric [Imperial] Example: 46cm [18in.]

Distance from Door

- Outward swinging (double & single): The minimum distance back from the door frame is 46cm[18in].
- Inward Swinging (double): The minimum distance back from the edge of the fully open door is 30cm[12in].
- Mall Opening (No moving doors): The minimum distance back from the lease-line or gate line is 30cm[12in].
- Sliding: The minimum distance back from the door frame is 46cm[18in].
- Single Inward Swinging (Entrance): The minimum distance back from the door frame (on the latch side of the door) is 30cm[12in]. This configuration typically only requires a single antenna on the latch side of the door. The inside edge of the antenna must be clear of the inward swinging door.
- Single Inward Swinging (Exit): Specifications are the same as the Single Inward Swinging (Entrance), with the exception of: a) In order to meet ADA (Americans with Disabilities Act) requirements in the UD the Antenna on the latch side of the door must be a minimum of 30cm[12in] from the edge of the door opening.

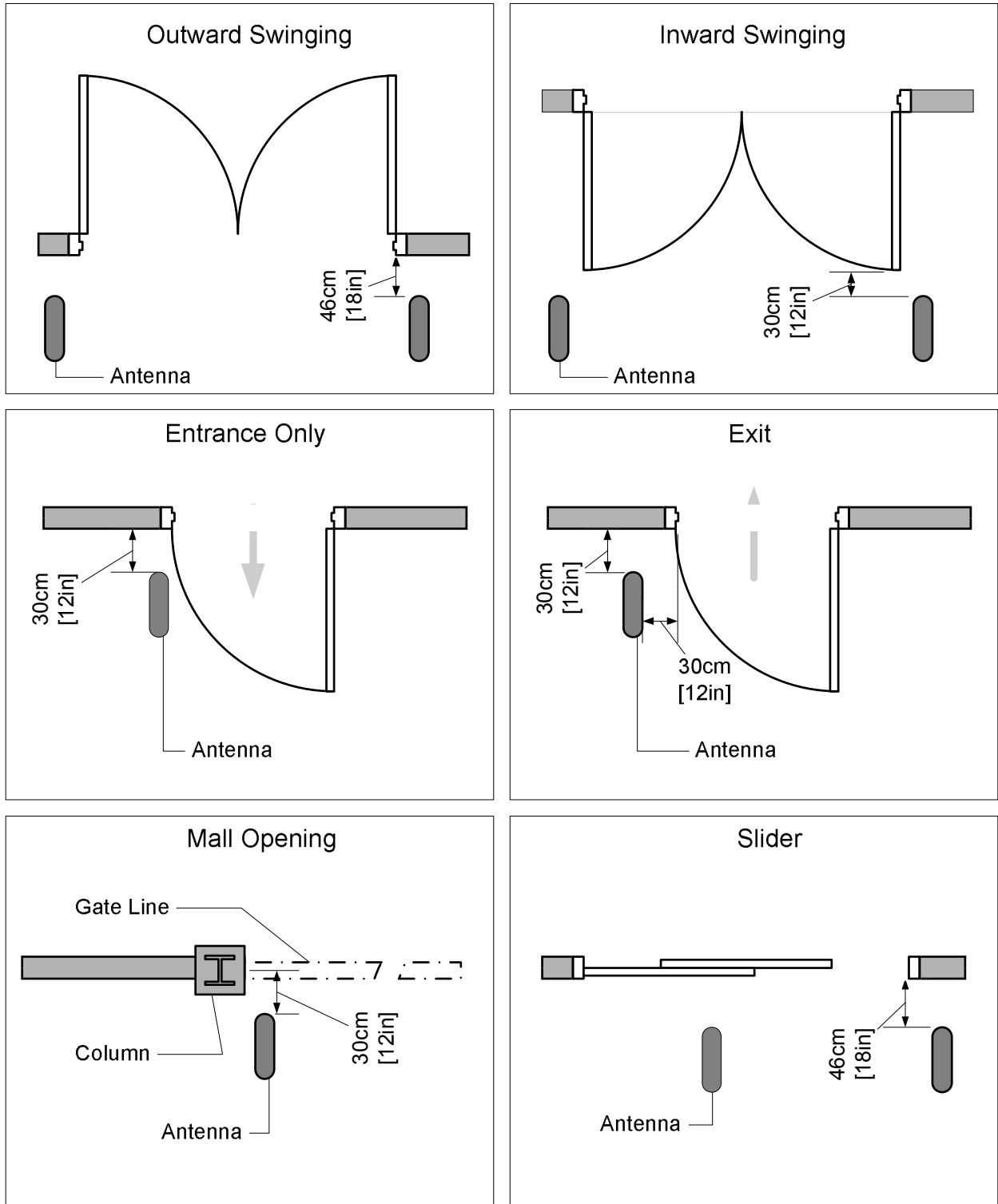


Figure 2 Recommended Antenna Placement

Please refer to the *Figure 2 Recommended Antenna* for proper antenna placement

Aisle Width

The maximum aisle width for the PX/QX Liberty antennas (with 410 series tag) is:

- PX with Coupler (PAB/SAB) – 1.8 m [6 ft]
- QX with Coupler (PAB/SAB) – 1.2 m [4 ft]

System performance is affected by aisle width and tag type. For aisle width details please refer to the Liberty Product Reference Guide

Power Supply

Both PX and QX with coupler antennas utilize a +24 VDC power supply.

Placement

The power supply can be placed near the system, under a cashwrap counter, under shelving, above the drop ceiling (if using plenum-rated cabling), or in a nearby utility closet.

Placement Requirements:

- The power supply must be within 18m [60ft] of the furthest antenna.
- The power supply must be placed no higher than what is accessible from a store ladder.
- If mounted in a plenum space, proper plenum rated wiring and plenum rated enclosures are required.

Note: For more information about power supplies, please see “Power Supplies” on Appendix 2

Antenna Mounting

Antennas are typically not mounted until after the finished flooring is in place.

Mounting Hardware

For mounting on Concrete Floor

Utilize two (2) 1.3cm [.5in.] anchor bolts per antenna.

Figure 3 Anchor Bolt (Concrete Mounting)



Wood Floor

Utilize two (2) 1.3cm [.5in] lag bolts per antenna.

Figure 4 Lag Bolt (Wood Mounting)



Wire Routing

Methods of Wire Routing

The cabling between PAB and SAB has to be routed either under floor or through floor wiremold. “Up & Over” routing method is not permitted for cabling between PAB and SAB.

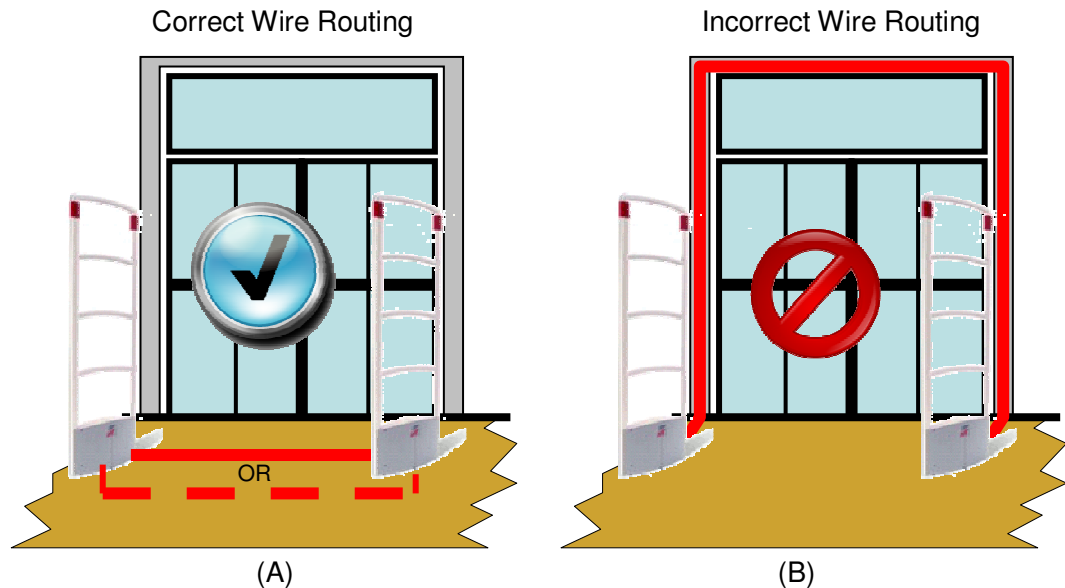


Figure 5 Methods of Wire Routing

- Floor Trench: Typically 1.3cm [.5in.] wide by 3.8cm [1.5in.], but an increase in dimensions is recommended for more than two antennas.
- Wiremold: 1500 or 2600 series wire mold can be utilized. Typically wire mold is not used within customer traffic areas, so a typical placement is from the outside of the antennas to the doorframe.
- Conduit: 2.5cm [1in.] diameter conduit can be utilized in new construction situations. It is recommended that swept 90 degree angles are used, and that pull-strings are provided by the conduit installer.
- Wall / Mullion: Wires can be contained within mullions, and hollow walls for vertical wire runs.
- Dek-Duct / Panduit: Wires can be contained within surface mount Dek-Duct or Panduit for vertical wire runs.

WARNING: Any wiring in plenum areas must be plenum rated. Additionally, ensure that the wire is installed in accordance with applicable (local/national) electrical codes.

ANTENNA WIRING

Overview

This chapter describes the PX/QX with Coupler primary (PAB) and secondary (SAB) antennas wiring and cabling.

WARNING: *This system runs on TR4026[†] electronics with firmware 46.0 or higher. It is critical to note that ONLY TR4026 electronics can be used in conjunction with this system.*

Information is covered in the following sections:

1. General wiring instruction
2. Single Aisle wiring
3. Multi Aisles wiring

General Wiring Instruction

This section describes how to prepare and wire all cables and wires involved in the antenna installation. Wires can be cut to required length.

Wiring between PAB/SAB

There are only two (2) wires connected between PAB and SAB. They are 1) RG59 coax cable and 2) SAB Light cable (22 AWG 4-conductor (STP) (5594))

RG59 Coax Cable:

A 3m[10ft] long, one end pre-terminated RG59 coaxial cable is packed with SAB antenna. It connects the coupler boards (J5) in the primary antenna (PAB) and in the secondary antenna (SAB). It is recommended to leave the pre-terminated end at the SAB. The installer has to terminate the other end at the primary antenna.

1. Strip the coax cable jack off for about 19mm [3/4in] at the un-terminated end, as shown in Figure 6 RG 59 Coax cable wiring diagram (A).
2. Separate and twist the shield braid tightly, leaving now loose strands.
3. Strip the center conductor to about 6 mm [1/4 in], insert it into connector pin #1, then tighten it with screwdriver.
4. Insert the twisted shield braid to the connector pin #2, and secure it with screwdriver.
5. Clamp 2 ferrite cores on each ends (PAB and SAB).

[†] Modified TR4024 electronics may be used in the first few shipments.

6. Figure 6 RG 59 Coax cable wiring diagram (B) shows the RG59 cable assembly been completely terminated with ferrite cores clamped on both ends.

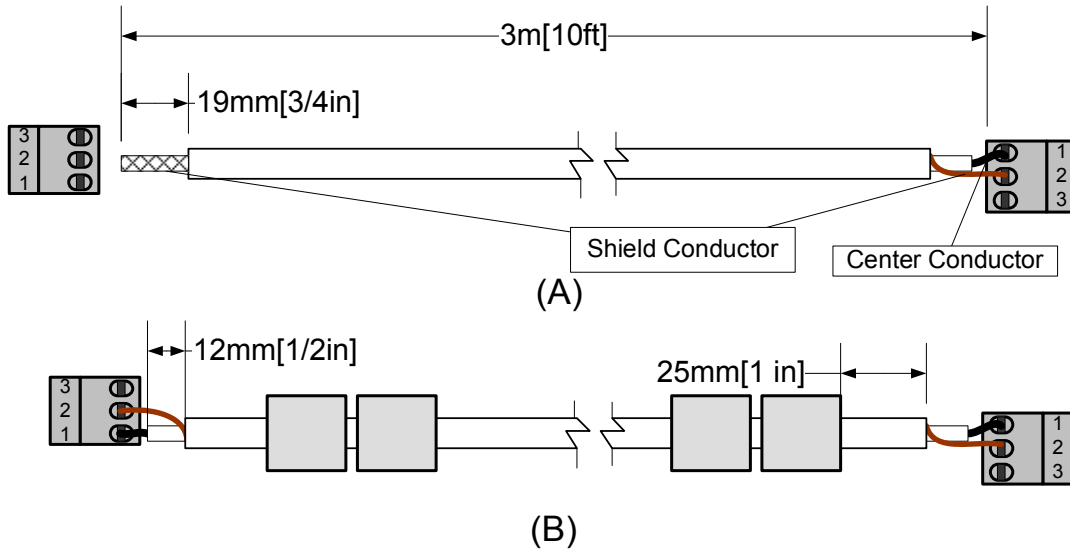


Figure 6 RG 59 Coax cable wiring diagram

SAB Light Cable

It is recommended to use CKP standard field service truck stock 4-conductor wire (AWG22). Red wire connects LT+ terminal and black wire connects LT- terminal. The SAB light cable must mount a cylindrical ferrite at each end in PAB and SAB. A ferrite core with three turns is attached to each end.

SAB Light Cable Wiring Table		
Wire Color	Primary Antenna (PAB)	Secondary Antenna (SAB)
RED	J11-1	LT+
BLACK	J11-2	LT-

Table 1 SAB Light Cable Wiring Table

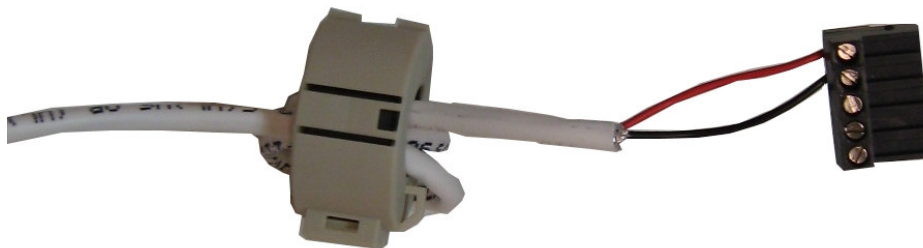


Figure 7 SAB Light cable with ferrite core.

Wiring between PABs

When multiple antenna aisles are installed, it may require installing sync wire and network communication cable between the aisles. For PX/QX with Coupler installation, all sync cables and network communication cables are connected to the TR4026 electronic boards in the primary antennas (PABs).

Sync Cable

The sync cable (RF Sync) needs to be installed between PABs if the distance between aisles is under 40 feet. If two aisles are more than 40 feet apart, no sync cable is needed. Use 22 AWG 4-conductor (STP) (5594) cable for sync cable. Follow the Sync Cable Wiring Table below to wire it to appropriate terminals. Sync cables are wired in daisy chain style. There are two sync cables in a PAB antenna, the input cable and the output cable. The first PAB only uses Sync Output cable, the last PAB has the Input sync cable. The Output cable connects from terminal (J10) to next PAB's Sync Input terminal (J9). **Figure 8 Wiring Sync Cable** illustrates the wiring method. Please refer the table below for Sync wire terminal connector pin assignment.

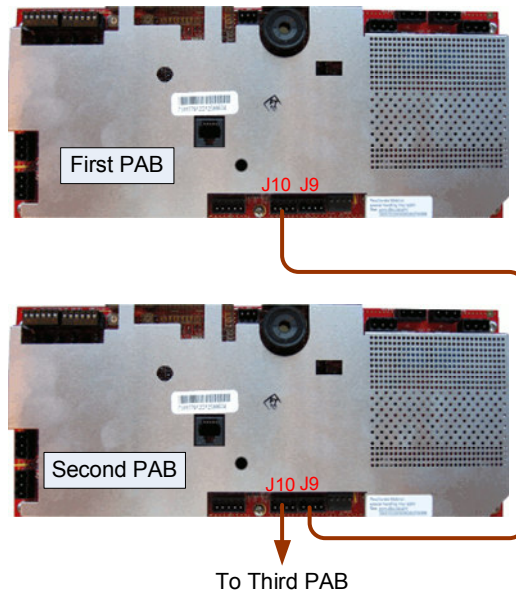


Figure 8 Wiring Sync Cable



Figure 9 Sync cable with ferrite core

Note: A ferrite core with three (3) turns is attached at each end.



Figure 11 Communication cable

COMM Cable (CAT5E)		
Wire Color	Description	J13/J14
Blue	DB-	1
White -Blue	DB+	2
Drain	GND	3
NC	GND	4
White-Orange	CB+	5
Orange	CB-	6

Table 3 Communication Cable Wiring Table

Wiring 24VDC power supply

A Checkpoint certified 24VDC power supply can power up to two (2) PABs. It is recommended to wire the 24VDC power supplier to the nearer PAB (J8), then, connect wire from this PAB's J12 connector to the J8 connector in the other PAB (J8). (See Figure 13 24 VDC power supply wiring method). 24VDC power cable uses AWG18 two (2) conductor cable.

Connect Pin #	Wire Color	Description
1	Black	GND
3	Red	+24 V

Table 4 Power Cable Wiring Table

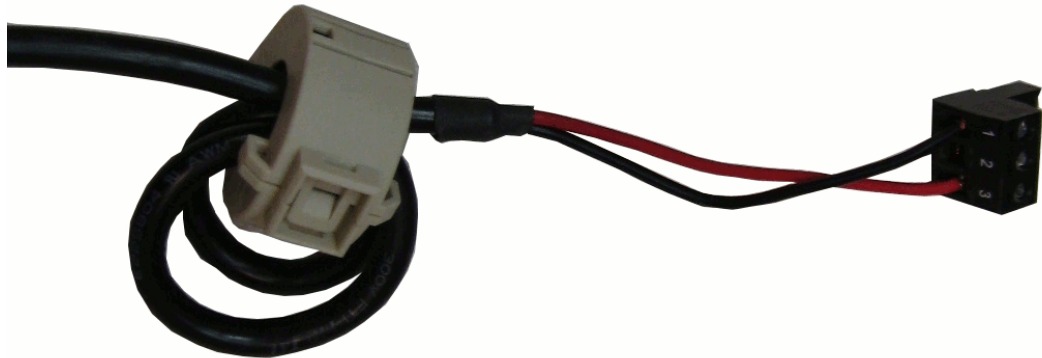


Figure 12 24 VDC Power Supply Cable

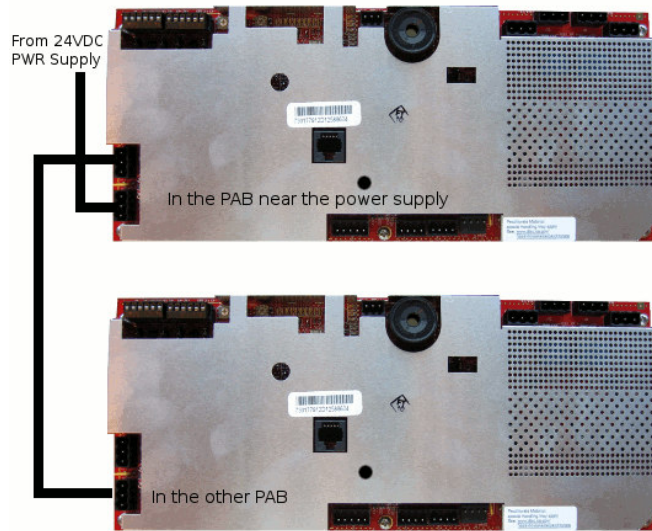


Figure 13 24 VDC power supply wiring method

Wiring peripherals

Follow the appropriate installation manual for wiring peripheral devices.

Single Aisle Wiring

The single aisle installation is the most common PX/QX with Coupler application which best utilizes the PAB-SAB configuration (see *Figure 14 Single Aisle*). A typical single aisle installation consists of a PX (QX) primary antenna (PAB), a secondary antenna (SAB), a power supply and a cable kit (packaged with secondary antenna). It is recommended to start SAB wiring first, then wire the PAB. Connect the power cable last.

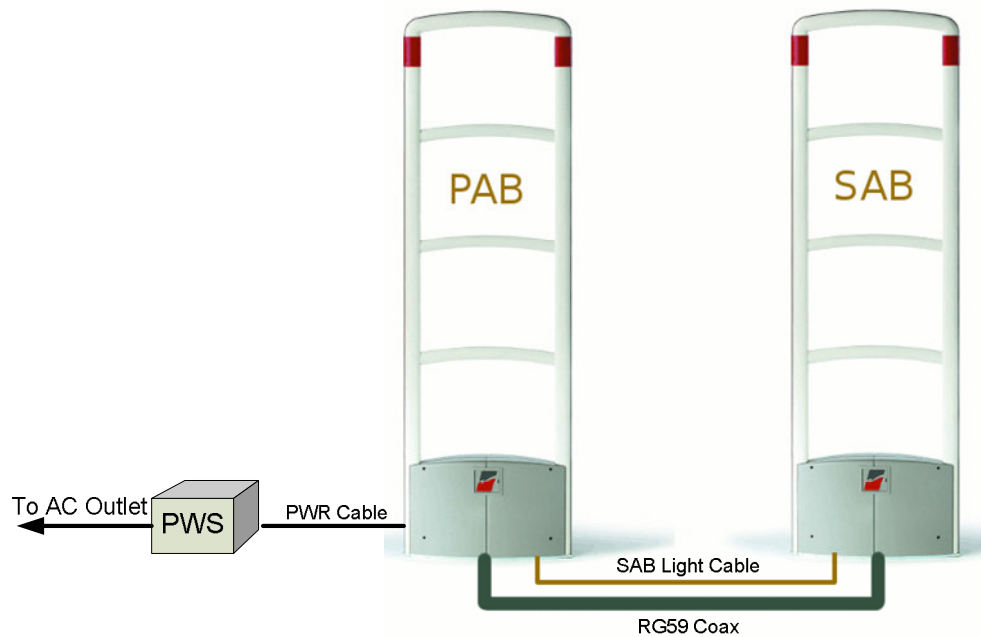
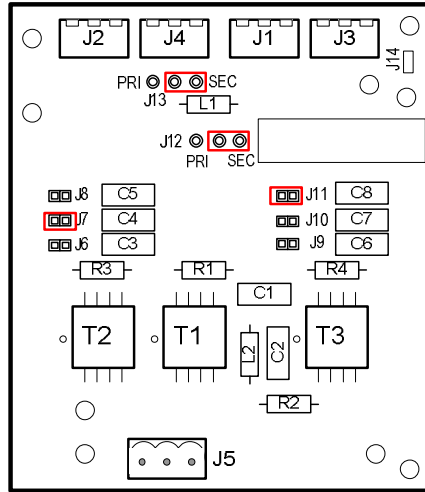


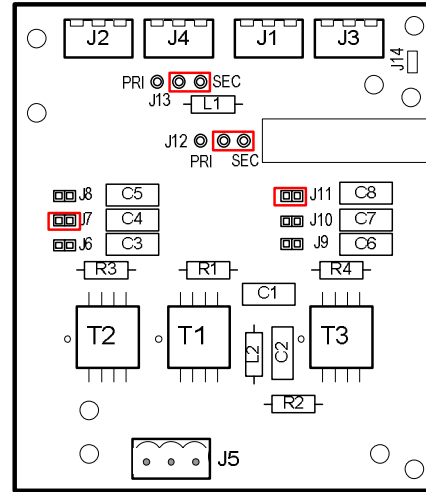
Figure 14 Single Aisle

Secondary antenna (SAB) wiring

- Step 1:** Open the base cover.
- Step 2:** Plug the pre-terminated RG59 coax cable onto coupler board J5, then mount two (2) ferrite clippers close to the connector (see *Figure 6 RG 59 Coax cable wiring diagram*).
- Note:** It is recommended to leave the pre-terminated coax cable end at SAB location where the cable was laid out.
- Step 3:** Connect the SAB Light cable to the wire terminal LT+ (RED) / LT- (Black).
- Step 4:** Inspect wiring and connections, confirm coupler board jumper settings (see *Figure 15 SAB Coupler Board Jumper Settings*).
- Step 5:** Put the base cover back and secure.



PX SAB Coupler Board Jumper Setting



QX SAB Coupler Board Jumper Setting

Figure 15 SAB Coupler Board Jumper Settings

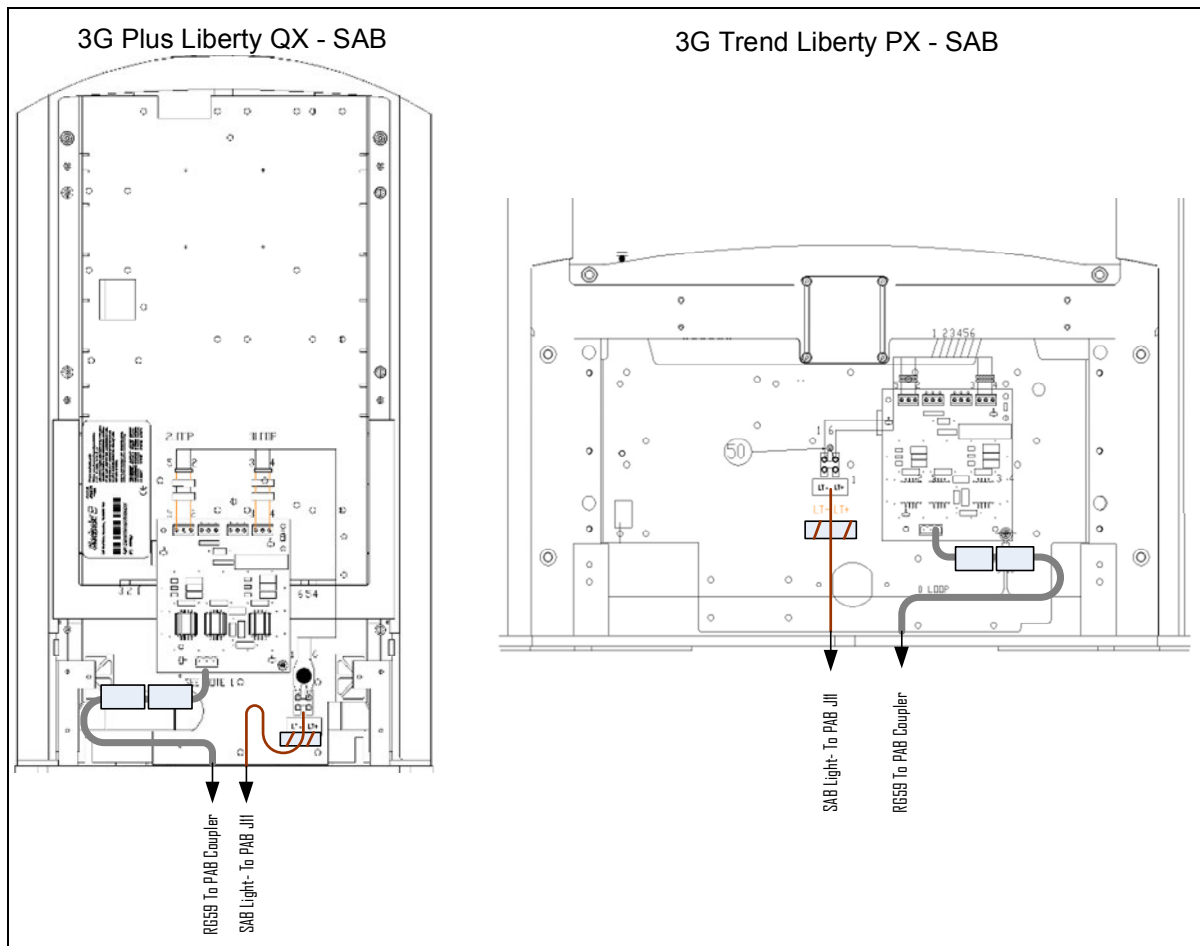


Figure 16 SAB Antenna Wiring

Primary antenna (PAB) wiring

- Step 1:** Open the base cover(s).
- Step 2:** Cut, strip and terminate the RG59 coax cable, then plug it to the coupler board. Check the coupler board jumper settings (see *Figure 17 PAB Coupler Board Jumper Settings*).
- Step 3:** Connect the SAB Light Cable wires to the J11 on the electronic reader board (TR4026).
- Step 4:** Connect network and peripheral cables (see next Chapter, Network and Peripheral Wiring), if required.
- Step 5:** Connect 24v DC power cable to J8 on the electronic reader board (TR4026).
- Step 6:** Inspect wiring and connections, confirm coupler board jumper settings (see *Figure 17 PAB Coupler Board Jumper Settings*).
- Step 7:** Put the base cover(s) back and secure.

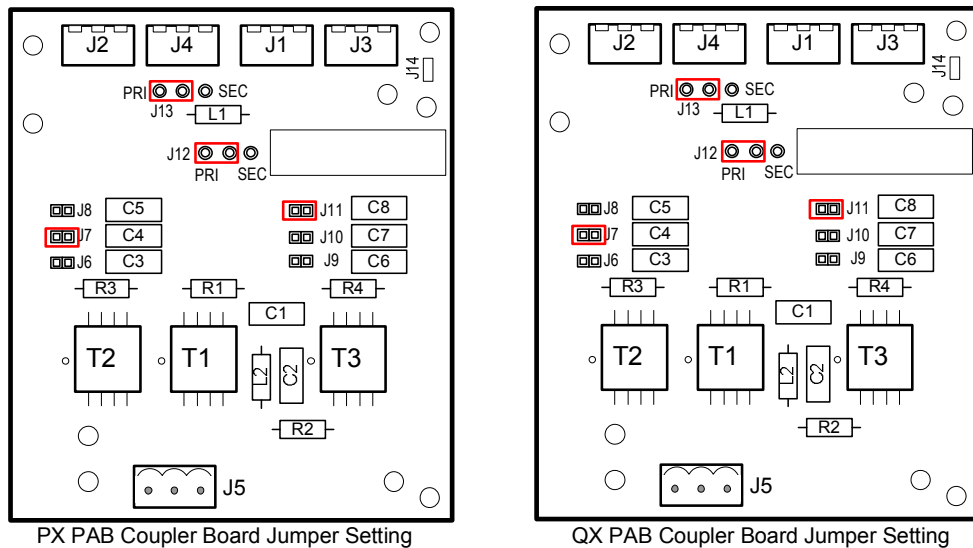


Figure 17 PAB Coupler Board Jumper Settings

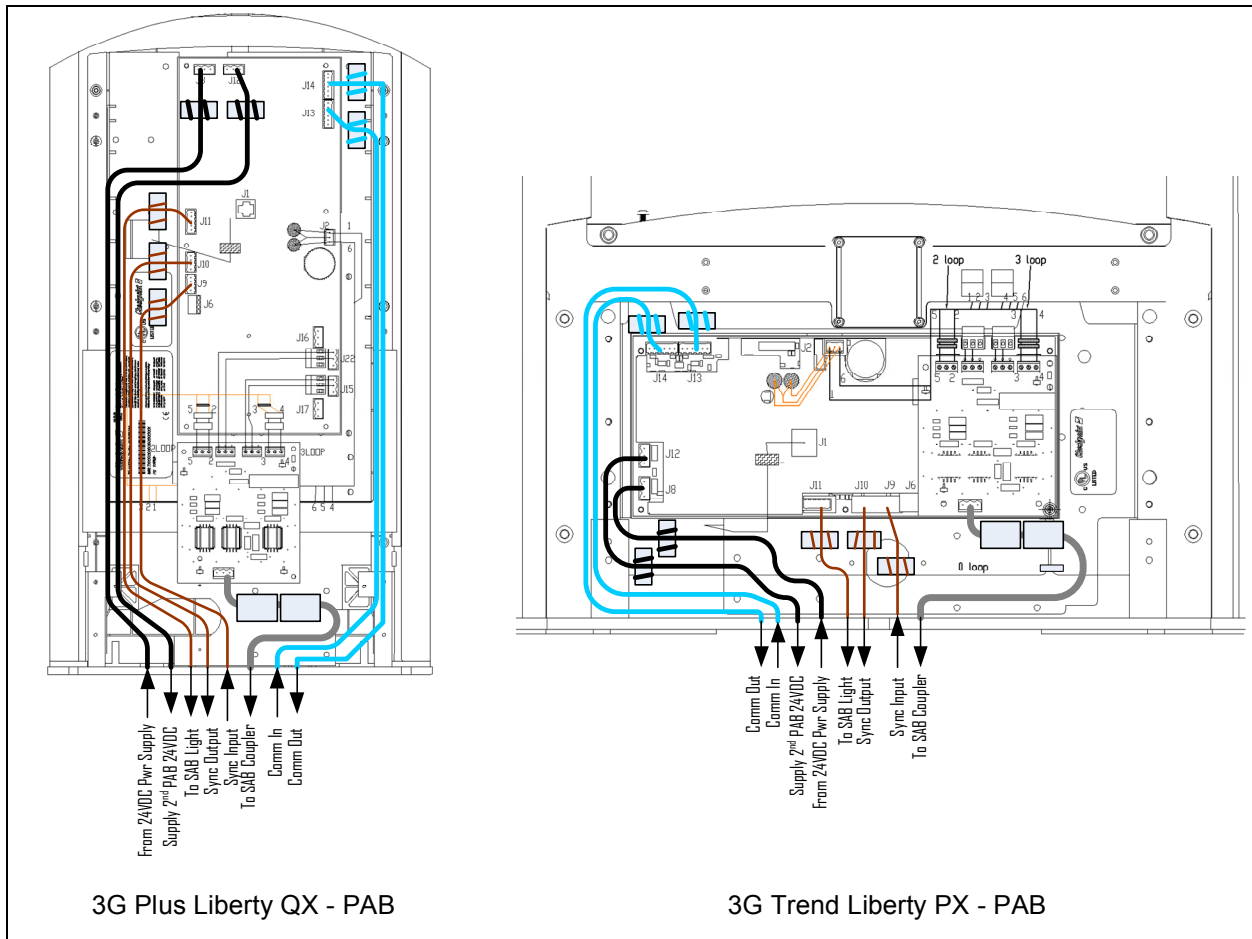


Figure 18 PAB Antenna Wiring

Multi-Aisle Wiring

A Multi-Aisle installation is when there are more than one antenna pairs installed at an entrance/exit location. Multi-Aisle installation consist two (2) or more primary antennas (PAB). If the distance between two (2) aisles is shorter or equal to 40 feet, sync cable(s) is needed to connect PABs' RF sync terminals. In addition, a 24VDC power supply can drive 2 aisles (except Celetronix LFVC36FS24S91). In some applications, inter-pedestal network is required for multiple aisle installation. Both 3G Trend/Liberty PX and 3G Plus/Liberty QX offer the capability of inter-pedestal communication network via PAB's communication ports. *Figure 19 Multiple Aisle* shows a typical two (2) aisle configuration.

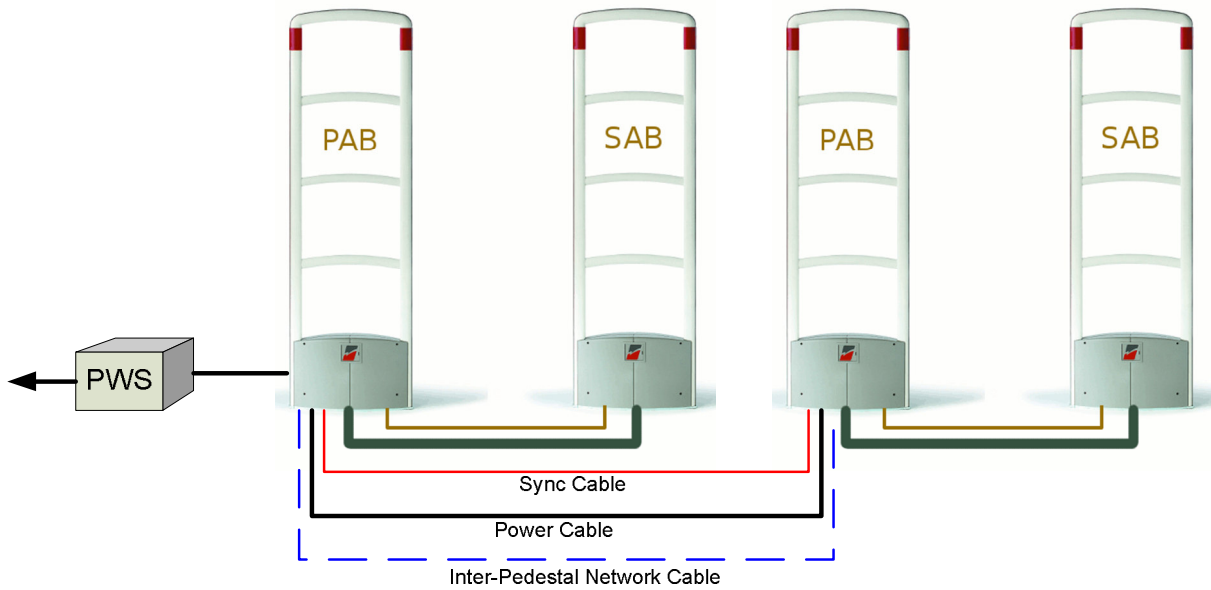


Figure 19 Multiple Aisles

Secondary antenna (SAB) wiring

Follow the same steps as they are described in Single-Aisle Wiring SAB section.

Primary antenna (PAB) wiring

- Step 1 to Step 5 are the same as they are described in Single-Aisle PAB wiring section.
- Step 6: Connect the sync cable to J 10 and J9 on the electronic reader board (TR4026).
- Step 7: Connect 24v DC power cable to J8 on the electronic reader board (TR4026). Connect another 24VDC power cable to J12 if there is a PAB powered via this PAB.
- Step 8: Inspect wiring and connections, confirm coupler board jumper settings (see *Figure 17 PAB Coupler Board Jumper Settings*).
- Step 9: Put the base cover(s) back and secure.

NETWORKING AND PERIPHERALS

Overview

This chapter describes the PX/QX with Coupler antennas network wiring and peripheral device wiring.

Note: all network wires and peripheral device wires go to primary antenna only.

Inter-pedestal Networking

Both PX and QX with Coupler systems offer inter-pedestal networking via inter-pedestal communication network. Please refer to the previous chapter for inter-pedestal communication network wiring. Use DMS tool to configure and setup inter-pedestal network (will described in next chapter)

Peripherals

Both PX and QX with Coupler systems support following peripheral devices:

- Voice Alarm
- Metal Detection
- Modem
- CheckPro Manager Unit
- Wifi (Only 3G Trend/Liberty PX supports this peripheral device)

Please refer the peripheral device's installation manuals for proper installation and wiring

SYSTEM CONFIGURATION VIA DMS

Overview

This chapter reviews how to configure 3G Trend/Liberty PX and 3G Plus/Liberty QX PAB/SAB system using DMS. Antenna tuning including coupler jumper setting are covered in a separate document “3G Trend/Liberty PX and 3G Plus/Liberty QX PAB/SAB Tuning Guide”. Please follow this tuning guide to optimize the system performance after completing the system configuration.

Note: *Please use DMS version 1.5.8 and later. TR4026 firmware version must be V46.00 and later.*

System Setup Using DMS

PX/QX with Coupler systems run with firmware version 46 and later. It requires DMS tool version 1.5.8 and later version.

Single-Aisle setup

The Single Aisle Setup process consists of following steps:

1. Make a new DMS connection – for new installation
2. Setup the aisle as PAB/SAB (coupler) operation mode
3. Antenna Tuning

Make a New DMS Connection

1. Connect the service PC laptop to a TR4026 board in a PAB
2. Launch the DMS program (version 1.5.8 and later)

Note: *Please refer DMS User’s Guide for help in using DMS tool.*



Figure 20 Login DMS

3. A login window will show up. Type in your user name and password. Then click **OK** to login DMS
4. DMS will bring up and connections windows as shown as in Figure 21 Add a Connection. Then double click the icon named “ **Add Connection Creates a new connection**”

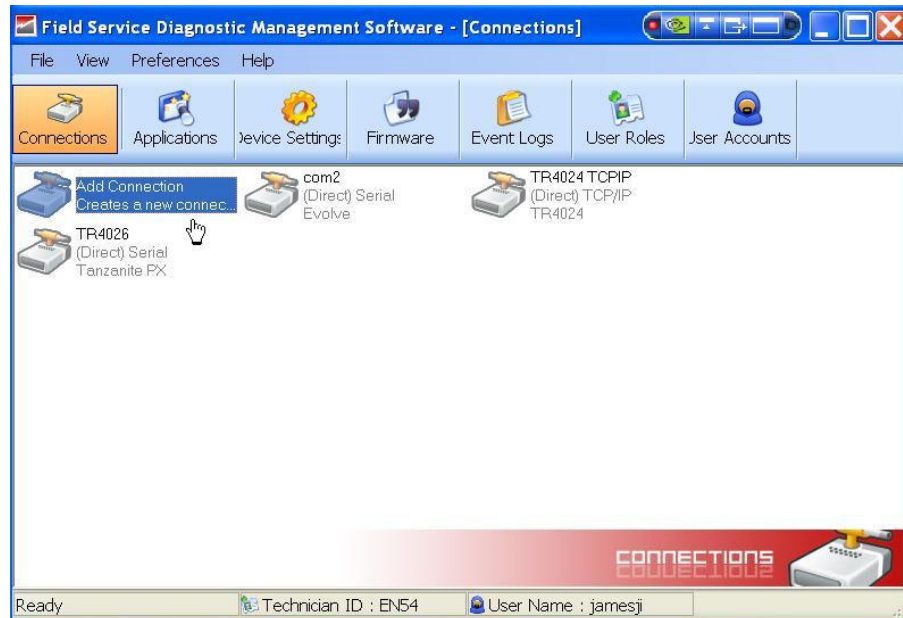


Figure 21 Add a Connection

5. A “Connection Wizard” program will start. Click **Next**, and proceed to the “Add Connection” window.
6. In the “Add Connection” window, enter the name and description in the “Connection Identifier” section. In the “Connection Setting” section, make selection at “Type” and “Device” selection boxes. Shown in *Figure 22 New Connection Setup*

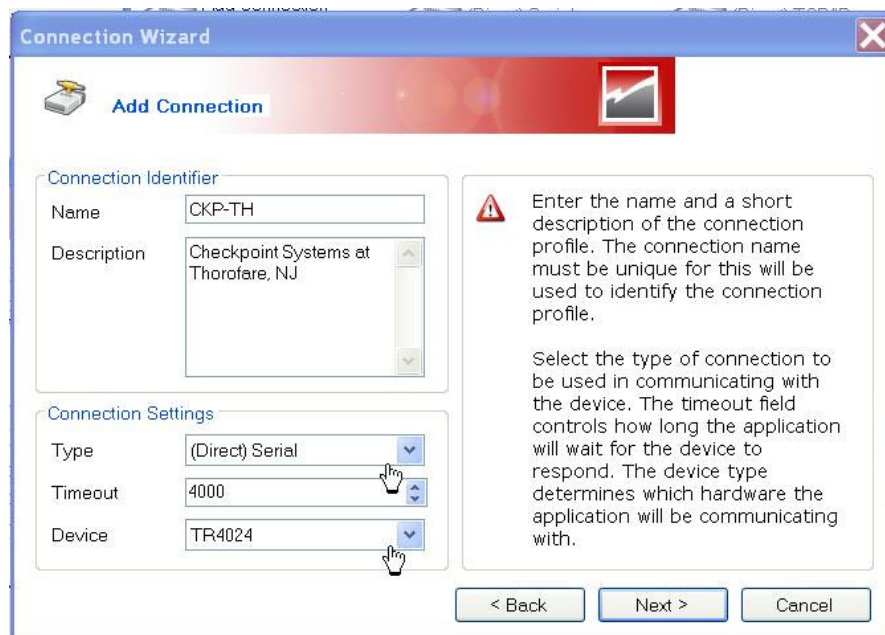


Figure 22 New Connection Setup

7. Click **Next**, a serial port selection window shows up, select a proper COM port on your laptop which the TR4024 is connected; then click **Next**. The final connection summary window comes up, click **Finish** to complete the new connection setup.
8. Now the “Add a new connection” step is complete. The new connection icon “CKP-TH” appears in the DMS connection window as shown in the figure below.

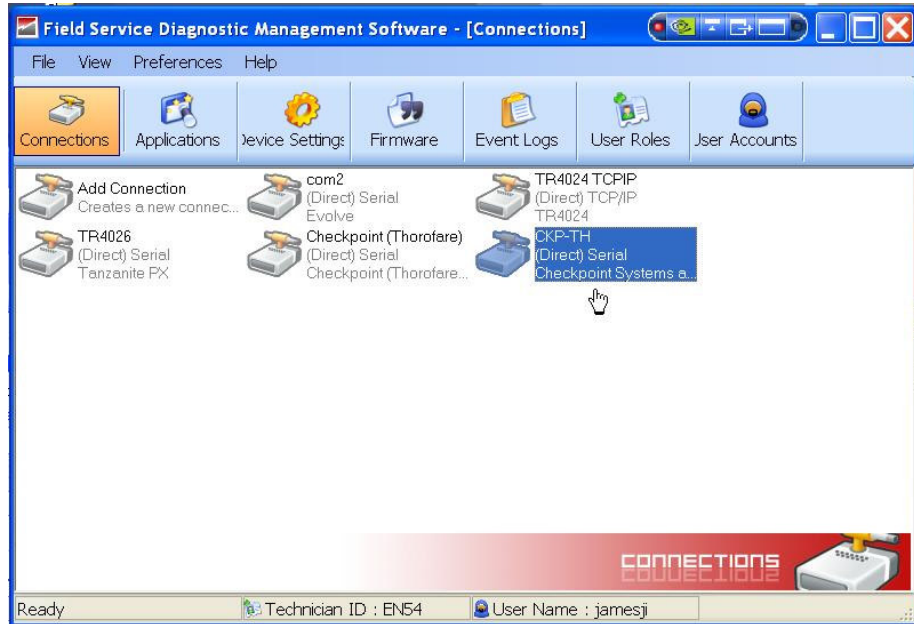


Figure 23 A New Connection Added

Setup the aisle as PAB/SAB (coupler) operation mode

1. Double click the newly added connection icon in the DMS connection window (e.g. CKP-TH), a device connection window comes up. In the network view, you can expand all device levels shown as in the figure below. Then select the aisle **TR4024/26**.

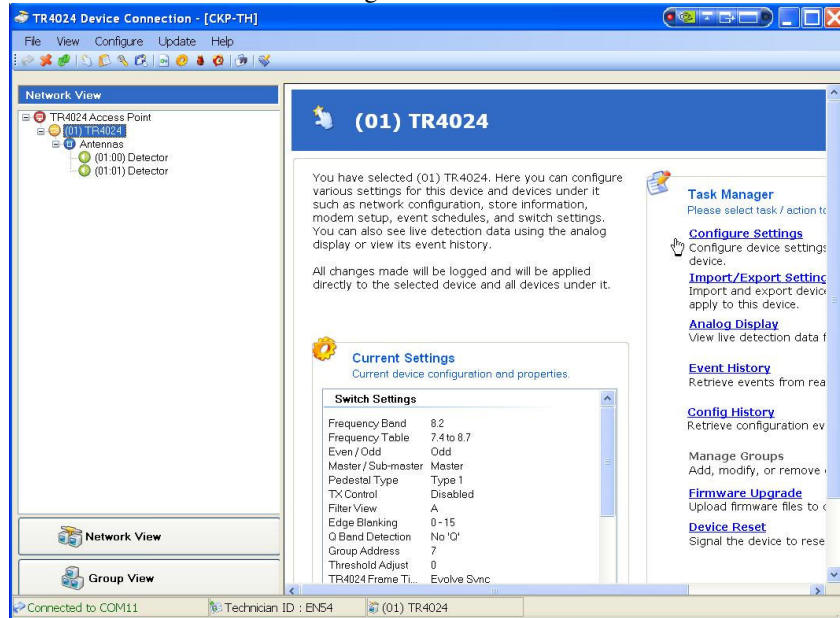


Figure 24 DMS Network View

2. Click the **Configure Settings** from the Task manager on the right side
3. A configuration window comes up, select **Switch Settings** and then click **Next**.

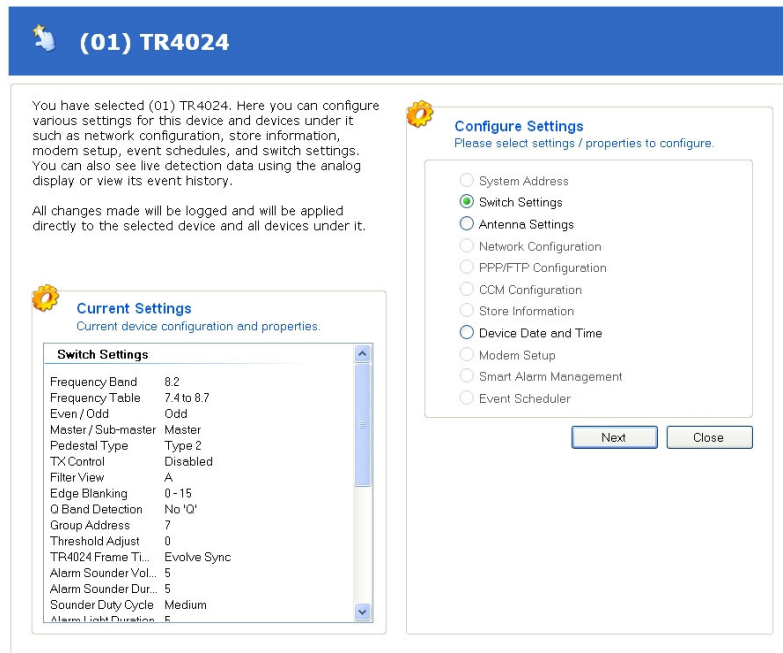


Figure 25 Switch Setting

4. Select “Detection” tab. Check the “Pedestal Type” box, select “Type 2”, as shown in figure below.

Note: *Type 2 represents PX/QX with Coupler PAB/SAB operation mode.*

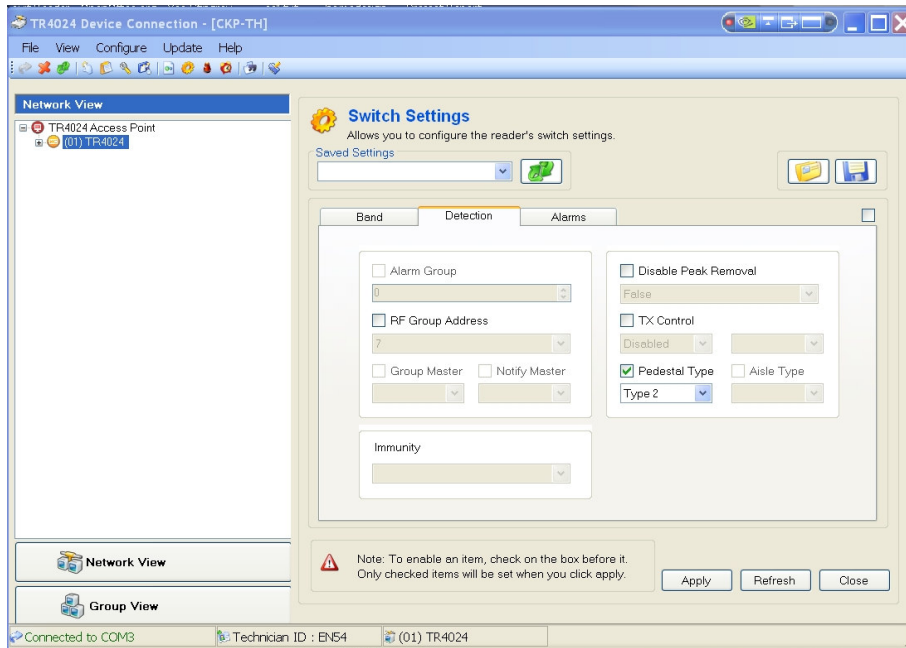


Figure 26 Select Type 2

5. Click **Apply** to complete the setup. A “Switch settings successfully set” message box will come up. Click **OK** and **Close**.
6. Go back to the “Network View” window, and expand the network device level. The device names under Antenna have been changed. Shown in *Figure 27 Single Aisle Setup Completion*. This confirms the success for setting the PX/QX with Coupler operation mode.

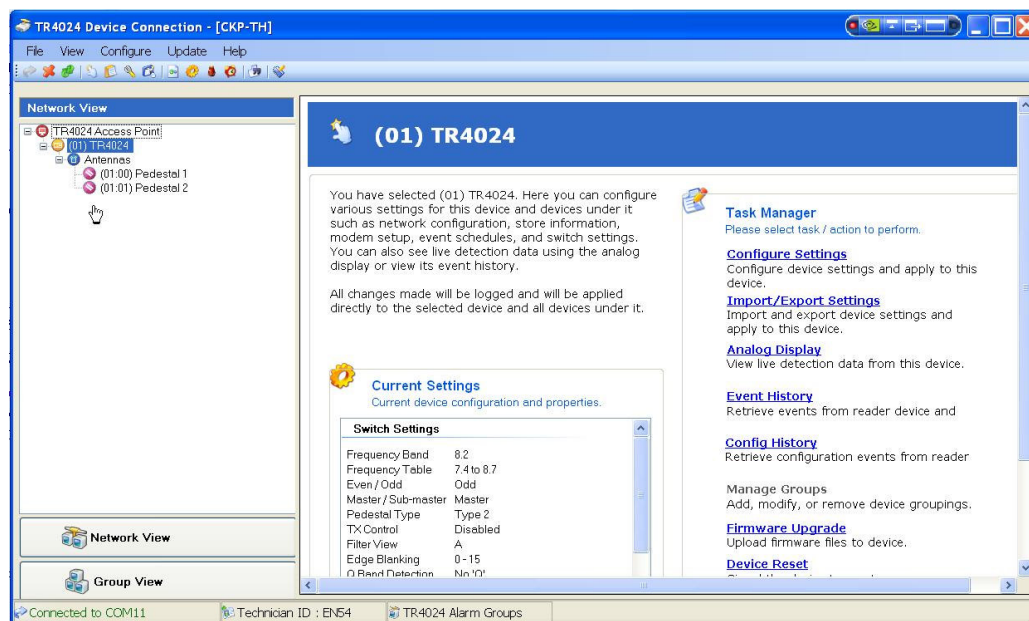


Figure 27 Single Aisle Setup Completion

Antenna Tuning

Please follow a separate document “PX/QX with Coupler Tuning Guide to complete this task.

Multi-Aisle Setup

The difference between a multiple aisles system and a single aisle system is that there is a master aisle in the multiple aisles system, and the rest aisles are the sub master systems. Therefore, in addition to setup the PAB/SAB (coupler), it needs to setup the master/submaster configuration. Therefore the steps involved in a multiple aisles system are:

1. Make a new DMS connection – for new installation
2. Setup the aisles as PAB/SAB (coupler) operation mode
3. Setup Master and Sub Master aisles
4. Antenna Tuning

Step 1, 2 and 4 are the same process as described in Single Aisle Setup.

Step 3 Setup Master and Sub Master aisle.

There only one master antenna in a multi-aisle system. Remaining pedestals are set to submasters.

1. Select the master antenna from the network view
2. Click Configure Settings on the right side.
3. Select Switch Settings from the Configure Settings window, then, click **Next**.
4. Click the “Band” tab, and select the Master from the Master/Submaster selection box.
5. Click **Apply**. A success setting message box will come up. Click **OK**. Then, click **Close** to return to network view.

6. Select the next antenna from the network view
7. Repeat step 2 and 3,
8. Click the “Band” tab, and select the SubMaster form the Master/Submaster selection box,
9. Click **Apply**, Same as step 5.
10. Repeat step 6 to 9 for rest PAB antennas in the network view.

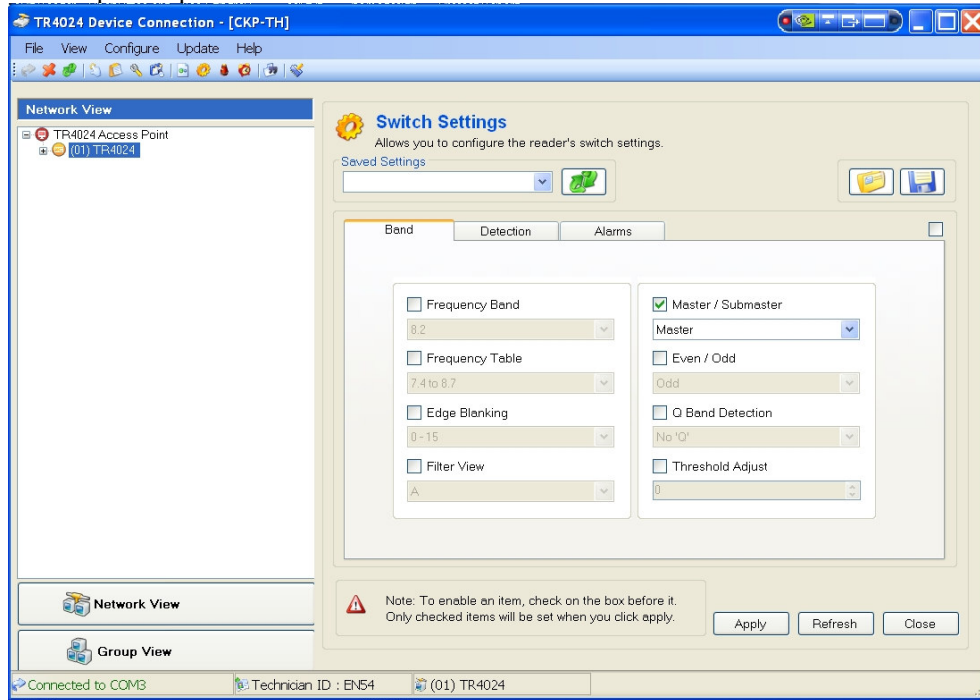


Figure 28 Master/SubMaster Selection

Antenna Tuning

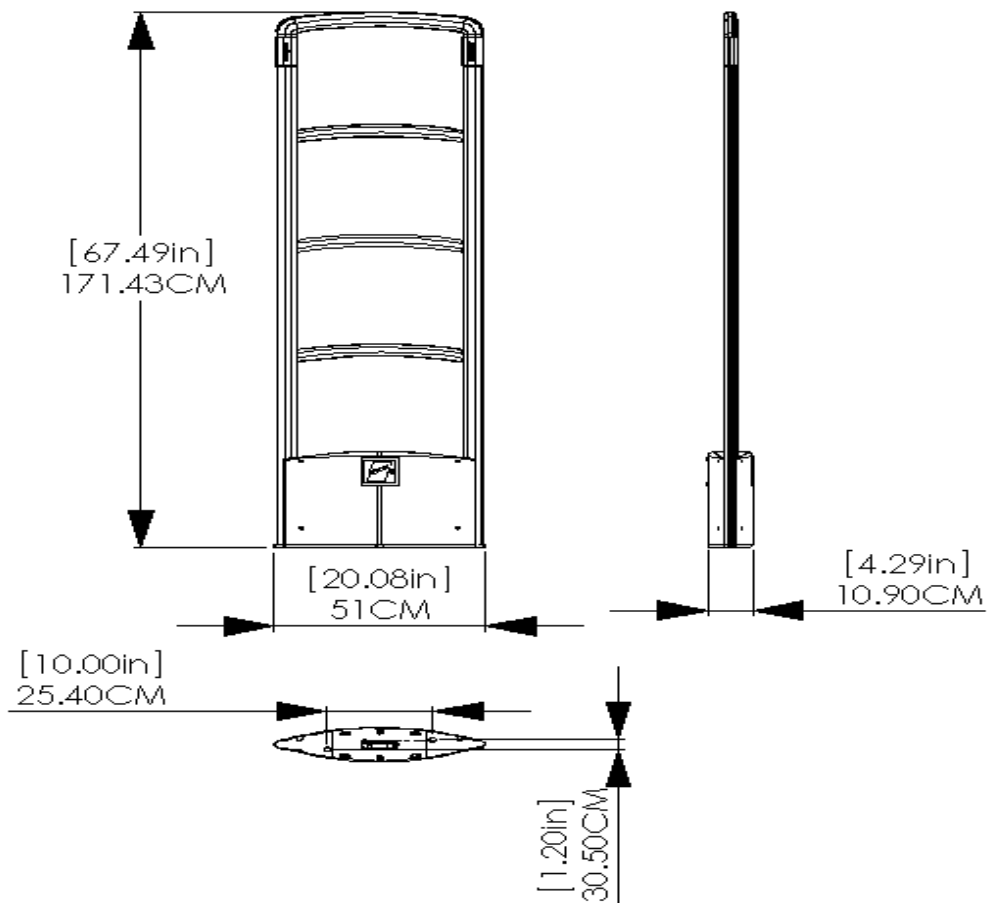
Please follow the PX/QX with Coupler Tuning Guide to perform the procedures.

APPENDIX

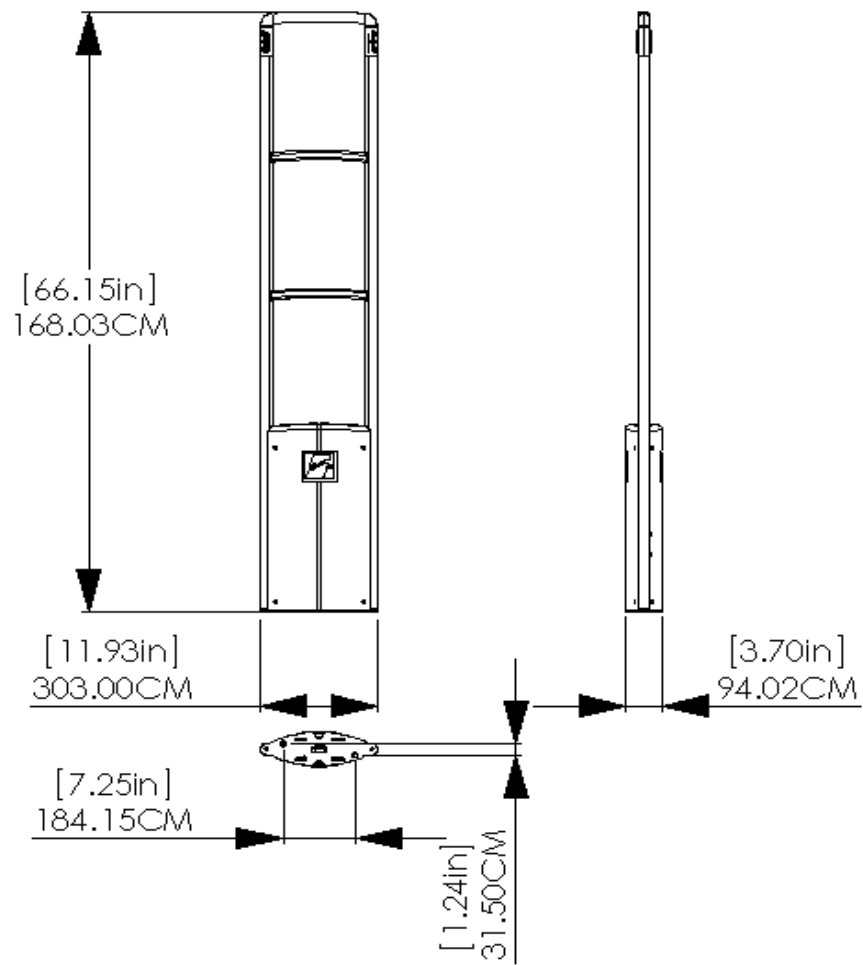
1

ANTENNA DIMENSIONS

3G Trend/Liberty PX



3G Plus/Liberty QX



POWER SUPPLIES

Overview

This appendix covers all available (US and EU) 3G Trend/Liberty PX and 3G Plus/Liberty QX compatible power supplies.

Details

Power supplies have an output of +24 VDC.

Requirements

In the US, if the power supply is to be installed in a plenum (HVAC ventilation) area, the Globtek GS-599ES(R) and the Globtek GS-599MC-KIT(R) must be installed.

Capacity

The following power supplies can provide power for up to two aisle systems:

- Globtek GS-599 UF
- Globtek GS-599ES(R)
- Celetron LFZVC65SG24E

The following power supply can provide power for one aisle systems:

- Celetronix LFVC36FS24S91

Power Supply Used in United States

Model

The US market uses one power supply types:

- Globtek GS-599ES(R) (PN: 7116509)

Standard power supply rated for use in plenum areas.

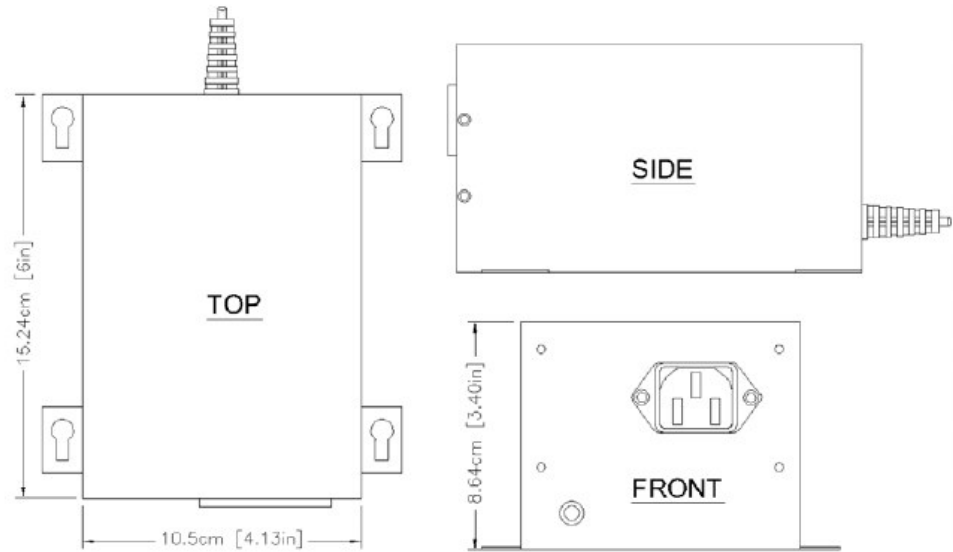
Note: *For use in plenum areas, the Globtek GS-599MC-KIT(R) must be used in conjunction with the Globtek GS-599ES(R).*

Dimensions

Width: 10.50cm [4.13in]

Length: 15.24cm [6.00in]

Height: 8.64cm [3.40in]



Power Supply Used In Europe

Model

The EU market uses one power supply types:

- Celetronix LFVC36FS24S91 (PN: 7683707)

Dimensions

Length: 8.89cm [3.50in]

Width: 2.42cm [0.95in]

Height: 4.47cm [1.75in]

